Botanical Gazette.

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EDITORIAL.—DR. ASA GRAY sailed for Europe September 4th, to be absent a year or two. His head quarters will be Kew Gardens, but he will probably visit several of the large herbaria upon the continent This trip is in connection with Dr. Gray's work upon the Synoptical Flora of North America. It is to be hoped that this crowning work of a long botanical life will be speedily completed, although the author has met with very little financial encouragement thus far. To be poorly patronized seems to be the necessary accompaniment of very great works, for they are necessarily expensive. The Synoptical Flora, though, should be in the hands of every North American botanist, especially those to whom the author has uniformly given a kind hearing and prompt response. A note to Dr Goodale or Sereno Watson at Cambridge would probably elicit all desired information as to price.

A LARGE COLLECTION of the products of Indian plants has just been received at the Botanic Gardens, Cambridge, from Kew. The collection is a part of what was put up in India for the Vienna Exhibition and is very rich in its representation of Indian drugs, foodstuffs and vegetable products used in the arts and manufactures. For illustrating lectures upon economic botany it is very complete, as there are representatives of useful products from nearly every family. The University of Wisconsin, Purdue University, and Wabash College, Ind., are under very great obligations to the Director of the Botanic Gardens for very complete duplicate collections.

IN THE JULY NUMBER of the GAZETTE we announced the proposed exploration of the botany of the West Indies, under the direction of Baron Eggers, of St. Thomas. We should add that the particular aim of this exploration will be to make known the botany of the great islands of Hayti, Dominica, and Porto Rico, of which very little is really known, and that little is of ancient date, and little accessible. Also, that it is intended to have the plants arranged and studied by high authorities, and generally named before distribution. It having been suggested that the price for phaenogamous plants, announced at $12.50 the century, is rather high, we understand that it is intended to bring it down to the usual ten dollars the hundred specimens. But in this case a good number of subscribers should be secured.

DR. DODEL-PORT, of Zurich, has published the first two parts of a new botanical work. The title is "Illustrirtes Pflanzenleben." The

first part is devoted to a popular description of the lower fungi, such as those which produce putrefaction and contagion. Part second is devoted to carnivorous plants. The whole work is profusely illustrated.

EUCALYPTOGRAPHIA is the title of a descriptive atlas of the Eucalypts of Australia and the adjoining islands, by Baron F. von Mueller. At present there have been published but two decades of the work. This group of trees seems to be a most remarkable one in size and in value. The genus *Eucalyptus* is a very large one, and by no means have all the forms been described. The Eucalypts, as they are called, are said to yield hard timber, oils, tars, acids, dyes, tan, and potash. Some of them rise to a height of 300 feet, with a stem six feet in diameter, and sometimes ten. Packing paper has been prepared from the inner layers of the bark. One species, *E. alpina*, is remarkable for its limited geographical range, being found only on the summit of Mt. Williams, Victoria, at an elevation of over 4,000 feet.

The agents for this work in London are Messrs. Trubner & Co.

EVOLUTION OF THE VEGETABLE KINGDOM, by Dr. Adolf Engler. Part I of this work is noticed in *Nature*, from which we take the following synopsis of contents: "The subject, 'The Extratropical Region of the Northern Hemisphere,' is divided into five sections. In the first section the author treats of the development of the flora of North America from the Miocene period to the Glacial epoch; the second is devoted to the development of the flora of Eastern and Central Asia since Tertiary times; the third to the main features of the development of the Mediterranean flora since the Tertiary period; the fourth to the development of high mountain flora before, during, and after the Glacial epoch; and the fifth to the consideration of the development of the floras of other countries influenced by the Glacial periods."

A NEW ENGLISH TEXT-BOOK OF BOTANY has been translated from the German of Prof. K. Prantl and revised by S. H. Vines. The object of this work is to provide a more elementary text-book than Sachs, but, at the same time, to follow his method of treatment. It seems to be principally made up of Sachs simplified, and in spite of some minor blemishes the reviewer in *Nature* pronounces it emphatically to be the best of its kind in the English language.

THE ROYAL GARDENS, KEW, have been lately receiving some valuable gifts. The herbarium of Dr. Goodenough, who died in 1827, has been transferred to the Gardens and the great collection of mosses accumulated by the late Prof. Schimper, has been presented to Kew by the Baroness Burdett Couts. Dr. M. C. Cooke has entered upon his duties as Cryptogamist of the Herbarium, taking charge of all the non-vascular cryptogams.

JAMAICA DOGWOOD, or *Piscidia Erythrina*, promises to come into quite prominent use as a medicine, the bark of the root yielding a drug that is claimed can be used as opium and with much better effects. It has been used in Jamaica and England as a nervous sedative, and a contributor to the *Therapeutic Gazette*, says that the

sleep produced by it is "tranquil and refreshing, and free from dreamy sensations." Something that will soothe irritated nerves without any evil result is surely a *desideratum*.

MAWAH FLOWERS (*Bassia latifolia*) are exciting a good deal of attention just now. This plant is cultivated as cattle food, and several tons of the flowers have been received in New York from Calcutta. When packed they form a dark brown, sticky mass which is anything but attractive. The flowers are very highly prized in India, both as an article of food and for use as a source of liquors. But the remarkable part of it is the nourishing material of the flower is lodged in the corolla, which is usually only a protective or attractive organ. This corolla contains no less than 63.40 per cent. of sugar, or more than half its weight. An excellent figure and full description of this curious plant appears in the *American Agriculturist* for September.

MR. LUCIEN M. UNDERWOOD, in the last *Torrey Bulletin*, gives some artificial synopses which are of considerable interest because they attempt to simplify such perplexing groups of plants. Of course the value of such keys depends upon their usefulness, and that can be easily tested. If we can take the synopsis of the *Umbelliferæ*, *Carices*, or *Salix* as given by Mr. Underwood and with reasonable ease find the specific name of any member of these groups. these pages of the *Bulletin* should be cut out and pasted in our Manuals.

THE AMERICAN JOURNAL OF SCIENCE AND ARTS for August, contains a very curious note in the Natural History Department of "Scientific Intelligence," which is rather unusual in that eminent journal, for it devotes half a page to a note on "Mucorini as the Chief Source of Mineral Coal," which in a clause at its close it shows to be unworthy of any notice. When an investigator announces conclusions that are "wholly opposed," not only to "those of other investigators." but to "the facts," and when he has "evidently misunderstood the objects under examination" and given us "supposed facts," it is generally supposed that *Silliman's Journal* will ignore him.

"DOG-FENNEL" seems to change its name with its place. In glancing over an agricultural paper we see notices of "dog fennel," and the eastern editor says it is *Eupatorium fœniculaceum*. This may be so where this *Eupatorium* grows, but to every man. woman and child in the west, "dog-fennel" means *Maruta Cotula*, or the eastern "May-weed."

PROCEEDINGS OF THE PHILADELPHIA ACADEMY, Part I, 1880, is just at hand, and we note the report of the committee on plants introduced by means of the International Exhibition. The report can be condensed into the simple word "nothing," for although 13 plants were found that were "strangers," not a single one of them showed any tendency to set seed or spread. Some of the 13 are our own western plants, others are from Europe, and a few from Japan.

NOTULÆ EXIGUÆ.—In the May number of the GAZETTE the undersigned asked for fresh seeds of *Ipomœa pandurata*. A few were kindly supplied by an obliging correspondent (whose letter and name have

been lost), and one has germinated. It behaves in the manner anticipated. In view of the curious behavior in germination of *Megarrhiza* and of *Ipomœa leptophylla*, which both agree in lengthening greatly the petioles of the cotyledons, and both have a huge root, it was thought likely that *I. pandurata*, which is also huge rooted, would also keep its caulicle short and elevate its cotyledons on long petioles. And we find that it does so. The germination of the tuberous-rooted species of New Mexico and Arizona, also of the Carolin an *I. Jalappa*, should now be observed. Mr. Darwin, always sagacious, has suggested that the object of this peculiarity is to leave the primary bud upon the apex of the huge root well underground, for its greater safety, whether against severe cold or drought. It will be interesting to know whether all the great-rooted *Convolvulaceæ* have this peculiarity. Seedlings of *Ipomœa Jalappa*, sent by Dr. Mellichamp from South Carolina, appear to present an intermediate condition.

A good illustration of the truth of the doctrine "ne nimium crede colori" is supplied by Dr. Charles W. Swan, of Lowell, Mass., who sends us white flowered individuals of *Gratiola aurea*, growing in the midst of bright yellow ones; also after a little search, some intermediate ones with pale yellow corolla.

In my First Lessons, in Structural Botany, etc., I have taken the embryo of Maples, without discrimination, as a pattern of embryo without a plumule ready-formed. I ought to have known the soft White-Maple (*Acer dasycarpum*), having thick cotyledons, well stored with nourishment, ought to have a ready-formed plumule. If I had thought of it and examined, I should have found it so, and should have used this species as an illustration. Mr. C. S. Deane, of Grundy, Iowa, has supplied my omission and called my attention to the fact. There is a good plumule in the seed, like that of the bean. In the books referred to, where Maples in general are mentioned, Sugar Maple and Red Maple are to be understood.

Polygonum cilinode roots at the tip of slender axillary branches, and so propagates freely. This is noted by E. L. Hankenson, of Newark, New York.

Cleistogamous species of *Helianthemum* were supposed to exist only in America. Dr Ascherson calls attention to one in Spain and another in Egypt which were essentially indicated by Linnaeus and by Delile. He particularly confirms the fact, and speaks of a number of other plants which become cleistogamous in the African desert, where insects are scarce.

It was Prof. Decaisne, we believe, who long ago explained that the uncultivability of Rhinanthideous plants (such as *Pedicularis*, *Gerardia*, etc.) was owing to their parasitism in early life. He has, of late, succeeded in raising them well by sowing the freshly ripened seeds on turf, containing grasses and Leguminous plants. It should be tried with our Gerardias and the pretty *Orthocarpi* of California.—A. GRAY.

MESEMBRIANTHEMUM, not *Mesembryanthemum*.—So it is properly written by Jacob Breyne, who made the name, and by Dillenius

who took it up, both giving the derivation from "*mesembria*," midday, alluding to the time the blossoms open. But both Breyne and Dillenius about half the time wrote *Mesembryanthemum*. Linnæus, adopting the latter, became consistent by making a wrong and far-fetched derivation to match the orthography. Among systematic writers Sprengel almost alone keeps to the correct orthography, and Webb insists on it. The younger Breyne, in his edition of his father's Prodromus, has a note about it (p. 81). He mentions an excuse for changing the orthography, namely, that some species do not open the blossom at noontide, and intimates that Linnæus' derivation from the insertion of the corolla around the middle of the germ, is open to the same objection. If heeded, that kind of objection would be fatal to very many generic names.—A. GRAY.

POTAMOGETON VASEYI, ROBBINS.—This species has usually been considered the rarest of all our pond-weeds. The fructiferous form with floating leaves, perhaps, is so, having been detected, so far as I am aware. in only two localities in the United States and one in Canada. The submerged form. however, promises to be much more abundant. In company with Mr. Edwin Faxon, of Jamaica Plain, Mass., I dredged for it this summer in Lake Quinsigamond, where a few specimens, floating on the surface, were obtained some years ago by Dr. Robbins.

This sheet of water resembles one of the lochs of Scotland, lying in a deep hollow among low hills. It is almost five miles long by half a mile broad. The water deepens abruptly from the shore, having on the outer edge of the bed a belt of stones and pebbles. Within this the bottom seems to be composed of silt washed from the surrounding hills. In this silt, at a depth varying from six to twelve feet, throughout the lake, we found *P. Vaseyi* growing in great profusion. It was mixed with *P. Spirillus*, *P. pusillus* and *Naias flexilis*.

This form of the species has filiform stems, 6–18 inches high, sending up long branches from the base and shorter ones above; leaves scattered, setaceous, 1-nerved, 1–3 inches in length, and tapering to a long needle-like point; stipules delicate, free, acute, 3–6 lines in length and rather persistent. The plant is propagated exclusively by gemmae, which are much like those of *P. gemmiparus*, but usually smaller and more delicate.

Our find shows the importance, when searching for aquatics, of using a dredging rake. Plants as slender as this cannot be seen from the surface unless the water is extraordinarily clear, nor even then well enough to determine what they are. I have found myself repeatedly deceived in fishing up something dimly discerned on the bottom which proved to be very different from what I expected. Had we trusted to eyesight alone in this case, we should never have suspected what riches lay beneath the water.—THOMAS MORONG, *Ashland, Mass.*

BAPTISIA CALYCOSA, W. M. CANBY.—I have lately collected fine

specimens of this plant which has been in flower during the past month; and last year I had good opportunity for studying the legumes. The plant well deserves its name of *calycosa* as the calyx is very remarkable. Its lobes become somewhat enlarged in fruit, and nearly enclose the small legume, so that only the tips of the pod and the long curved style are exserted. The legume itself is about 4 lines long by 2 lines broad; the style is also about 4 lines long. Seeds 1–4, generally 2; base of stem woody. Stem 2–3 feet high, much branched; plant turns black in drying. I notice that the calyx is often 5-parted. A friend who lives in the region where this *Baptisia* grows, tells me that soon after the flowering season the plants are attacked by worms or caterpillars, which eat them greedily. Being unexpectedly obliged to remain in St. Augustine this summer, I expect to be able to include fine specimens of this plant in flower and fruit in my cheap sets for sale.—MARY C. REYNOLDS, *St. Augustine, Fla.*

THE COLLECTIONS OF DARLINGTON AND TOWNSEND.—It may possibly interest the old friends of the late Dr. Wm. Darlington and David Townsend, of West Chester, Pa, that the herbariums left by these gentlemen are now in the museum of the State Normal School of this place. The curators of the institution are having the plants carefully poisoned and glued down, together with the original labels mostly in the handwriting of these eminent botanists. Those especially left by Mr. Townsend are splendidly preserved, and indeed but few in the entire collection have been injured by insects. The typical local flora in the good old Doctor's herbarium, from which his *Flora Cestrica* was written, is interesting from the fact that the many forms of some changeable species are largely represented.—JOSIAH HOOPES.

PHYSALIS GRANDIFLORA.—In the month of June, 1878, I found a patch of *Physalis grandiflora*, growing in an old pasture lot, along the lowlands near the mouth of the Au Sable river, Iosco Co., Mich.

A specimen collected from this locality by myself is now in the herbarium of Dr. J. T. Rothrock, West Chester, Pa.

I believe this is the most southern limit at which this plant has been known to occur. At the date above mentioned it had never been reported south of the shores of Lake Superior.—C. B. COCHRAN, *West Chester, Pa.*

MICHIGAN LAKE SHORE PLANTS AND NOTES ON POPULUS BALSAMIFERA, VAR. CANDICANS.—The following list, together with the one published in the July GAZETTE, gives a somewhat general catalogue of the more distinctive flora of the sand dunes and beaches in the vicinity of South Haven, Mich.:

Nasturtium palustre, D.C, with the typical oblong pods. One plant was found on a dry, clay plot near the lake. *Arabis Canadensis*, L., common on high bluffs. *Cakile Americana*, Nutt., is not generally distributed along the beach. Of 100 average pods of this plant which I examined, only 47 had the seeds developed in both cells. *Silene*

antirrhina, L., is not uncommon in the sand. *Ceanothus Americanus*, L., occurs occasionally. The fruit is nearly as often 2-celled as 3-celled. Of 100 specimens of ripe fruit, 44 were 2-celled. *Phaseolus diversifolius*, Pers., often grows on the beach among rubbish.

It is worthy of note that *Cornus stolonifera*, Mx., is quite common on the highest bluffs. I have seen it growing luxuriantly in drifting sand over a hundred feet above the lake, and blossoming from June till near September. I have also seen fine plants of *Cephalanthus occidentalis*, L., growing in the loosest white sand, and far out of reach of the lake.

A form of *Solidago Virga aurea*, L., somewhat approaching var. *humilis*, occurs on the higher bluffs. *Cacalia atriplicifolia*, L., is abundant on wooded bluffs. *Hieracium Gronovii*, L., is often found in the same localities. *Penstemon pubescens*, Sol., is not generally abundant. *Monarda punctata*, L., is very common in dry sands. A dwarf and entirely prostrate form of *Amarantus albus*, L., occurs on low lands. The branches are bright red, the axillary clusters of flowers longer than the typical species and the whole plant presents a polished appearance.

On moist, grassy banks I find *Habenaria hyperborea*, R. Br., and along with it *Liparis Loeselii*, Richard. In the same locations occurs *Carex aurea*, Nutt. *Cyperus Schweinitzii*, Torr., grows on low banks; not common.

Of the grasses which grow on the sand dunes the most conspicuous are *Calamagrostis longifolia*, Hook., *Oryzopsis melanocarpa*, Muhl., *Festuca ovina*, L., *Elymus Canadensis*, L., var. *glaucifolius*, *Danthonia spicata*, Beauv., and *Panicum virgatum*, L.

In the last GAZETTE I stated that *Populus balsamifera*, L., var. *candicans* was native here. I have received inquiries as to why I think it indigenous. There is no doubt but that it is native both at South Haven and Bangor, Mich. As before stated, the existing specimens at this place are the remnant of a long grove, which contained large and thoroughly established trees when the first pioneers visited the place. They appeared to be coeval with the surrounding forest, with which they were interspersed for some distance back from the lake shore. Many of the trees were large enough for sawing timber. When they were discovered there were no settlements in Van Buren Co., and none within 25 miles on the lake shore.

At Bangor, ten miles inland, there was a large grove of these trees when the first settlers visited the place. Many of the trees were two feet in diameter and over 75 feet high. They were all destroyed years ago, but transplanted specimens can now be seen in that village. —L. H. BAILEY, JR., *South Haven, Mich.*

NOTES FROM ARKANSAS.—Double flowers of *Thalictrum anemonoides* with white and pink petals are not uncommon in N. W. Arkansas.

A great number of flowers of *Hypoxys erecta* upon the plan of double four were found last spring.

It is not uncommon to see *Tradescantia Virginica* built upon the

plan of single four. I noticed one with four petals and only two sepals, the fourth colored organ occupying the position of a sepal. (As the nature of an organ depends upon its position rather than its color or texture, this *Tradescantia* had three petals and three sepals, one of the latter having become petaloid.—ED.)

Collinsia violacea often has 7 flowers in a whorl, also the petals are blue, not *violet*.

Penstemon tubiflorus with three leaves in a whorl was found by Mr. F. W. Ellis, one of my pupils.

Trillium sessile, var. *Nuttalliana*, occurs with four leaves instead of three.

Scilla Fraseri sometimes has white flowers.

Ophioglossum vulgatum was found growing on the flat top of a limestone ledge 200 feet above the valley.

Æsculus glabra was found growing in Madison Co., Crawford Co., and as far south as the Red River. It attains a diameter of 15 inches in the Ozan bottom in Hempstead Co.

Found *Acer saccharinum* as far southwest as the Bois d'arc Creek, a northern tributary of Red River.

Magnolia acuminata occurs in Garland, Montgomery, St. Francis and Crawford counties, and probably in many other places.

Acer dasycarpum was found as far south as the Saline River in Saline Co.

Robinia Pseudacacia grows in Hempstead Co., on the "Black Lands."

Gymnocladus Canadensis occurs in Garland Co.

Prunus Chicasa undoubtedly grows wild in Southwestern Arkansas.

Pirus coronaria grows abundantly as far southwest as Red River in Arkansas. The fruit is very deeply depressed at the stem and blossom ends, and is more than twice as broad as long. I have been accustomed to seeing it nearly globular in the Western States.

Amelanchier Canadensis occurs in the mountainous regions of Southwestern Arkansas.

Nyssa uniflora was found as far north as Little Rock in cypress swamps.

Fraxinus quadrangulata occurs in Garland, Hempstead and St. Francis counties and in the northwestern part of the State.

Maclura is plentiful in Southwestern Arkansas.

Quercus bicolor is not uncommon in all the river bottoms of S. W. Arkansas.

Q. imbricata occurs in N. E. Arkansas.

Q. microcarpa occurs as far southwest as Red River.

Q. tyrata is the principal growth in some of the bottoms of the northern tributaries of Red River.

Catalpa speciosa grows large in Hempstead Co. Measured one tree 13 feet 10 inches in diameter, and saw several trees about 4 feet. This species, I learned, was introduced from Louisiana, but it is now spontaneous all along the creek bottoms of that region.

Juglans cinerea was found in abundance near Forest City, St. Francis Co., on Crowley's Ridge, growing along with *Magnolia acuminata*, *Liriodendron Tulipifera* and *Fagus ferruginea*. The latter attains a diameter of over three feet. It was also found in Clark, Ouachita, Columbia, Union, Miller, Nevada, Hot Springs, Dallas, and formerly in Hempstead counties.

Ostrya Virginica is very common as far southwest as the border of the State.

Juniperus Virginiana was found as far southwest as Hempstead county.

Castanea pumila attains a remarkable size in Hempstead Co., on the sandy soil of the Tertiary. A tree in the suburbs of Washing measured 13 feet 8 inches, one foot from the bottom, and several trees were observed over 3 feet in diameter.

There was a specimen of *Juglans nigra* formerly standing in the Red River bottom, of which only the stump now remains. This tree was measured by Col. Graliot (Col. 2d Ark. Infantry), now County Surveyor of Hempstead Co. It took 45 paces (?) to go around the tree, and 5 feet above the roots the Colonel could just hold together, with extended arms, the ends of a 33 foot chain, making the circumference at least 38 feet.

The genus *Cratægus* is represented by a large number of species in N. W. Arkansas.

The genus *Carya* is represented by seven, if not the eight, N. Am. species.—F. L. HARVEY, *Ark. Ind. Univ. Fayetteville, Ark.*

"SAXIFRAGA UMBROSA" ADORNED WITH BRILLIANT COLORS BY THE SELECTION OF SYRPHIDÆ.—Among Diptera the most assiduous visitors of flowers are certain Syrphidæ, which, elegantly colored themselves, are fond of splendid flower colors, and before eating pollen or sucking nectar, like to stop awhile, hovering free in the air, in front of their favorites, apparently fascinated, or at least delighted, by the brilliancy of their colors. Thus I repeatedly observed *Syrphus balteatus* hovering before the flowers of *Verbascum nigrum*, often *Melanostoma mellina*. and *Ascia podagrica* before *Veronica chamædrys*; in the Alps the lank *Sphegma clunipes* before *Saxifraga rotundifolia*, and in my garden *Ascia podagrica* before *Saxifraga umbrosa*. Of *Verbascum nigrum* the main fertilisers are humble-bees, Diptera co-operating only in a subordinate degree; in the case of the three other species, on the contrary, the above named Syrphidæ are such frequent visitors and cross-fertilizers that we may safely conclude that it is by their selection of elegantly colored varieties that these flowers have acquired their beautiful peculiarity. Hence, in order to estimate the color-sense of these Syrphidæ, it is worth while to consider what color-combinations they have been able to produce by their selection.

Saxifraga umbrosa being, as far as hitherto known, their finest masterpiece, we may in the first place look at the variegated decoration of this species. Its snow-white petals are adorned with colored spots, which in size and intensity of light gradually decrease from the

base of the petals towards their extremity. Indeed, nearest to their base, within the first third of their length, there is a large irregular spot of an intense yellow; about the middle of their length there follows a narrower cross band of red color, vermilion towards the base, intensely pink towards the outside, not reaching the margin of the petals, sometimes dissolved into several separate spots; lastly, beyond the middle of the length of the petals there are three to eight smaller roundish spots of a paler violet-pink color. The flowers of *Veronica chamædrys* prove that also gay blue colors are perceived and selected by Ascia.—HERMANN MULLER *in Nature.*

CAREX SULLIVANTII.—Mr. E. C. Howe, of Yonkers, West Chester Co., N. Y., writes that he has collected during the present season several specimens of the above *Carex*, and would like to exchange them for some Western Carices, such as *C Shortiana, C. Meadii, C. Bebbii, C. crus-corvi, C. conjuncta, C. muricata, C. cephaloidea*, or *C. Fraseriana.*

CROSS FERTILIZATION OF BAPTISIA TINCTORIA.—Prof. W. W. Bailey writes in reference to *B. tinctoria* that it is cross-fertilized by humble bees. Their weight on the keel causes a quick and decided lateral deflection of the wings, exposing the androecium. A careful study of this mechanism would be very interesting.

DOWNINGIA PULCHELLA.—In a field east of San Jose I saw last June at least five acres completely carpeted with *Downingia pulchella.* The nearly level ground had been sown with wheat which the April flood "drowned out" in the lowest places. In September the same ground will be covered with cocklebur.

The rare *Mentzelia Lindleyi* is abundant near Alum Rock, seven miles east of San Jose.—V. RATTAN, *San Francisco, Cal.*

NEW LOCALITY FOR SULLIVANTIA OHIONIS.—Happening to spend a day in the eastern part of Cass county, Indiana, I found on the limestone bluffs overhanging Pipe Creek, just before its junction with the Wabash River, *Sullivantia Ohionis* in abundance The general conformation of the country and the relative situation of *Sullivantia*, are almost exact counterparts of the station in Jefferson Co., Indiana, with the single exception that the bluffs are not nearly so high. The exposure and character of the soil seem to be identical.—M. S. COULTER, *Logansport, Ind.*

SCIENCE.—A Weekly Record of Scientific Progress. Illustrated. We have received the initial number of the above journal, which claims to "occupy a field in periodical literature hitherto unoccupied," "and the only first class weekly Journal in the United States devoted to science, recognized by scientists as their medium of communication." Furthermore, all desiring to keep "au courant", or rather

to be kept "au courant," since "Science" is the active agent, will find this journal invaluable. Having dipped thus far into the prospectus, we turned from the field of superlatives into the list of contributors. These are superlative, their names being a sufficient guaranty of the undertaking. In Vol. 1, No 1, we have articles by Prof. E. S. Holden, Prof. Burt G. Wilder, Francis P. Upton, and others, together with a mass of well selected extracts After a close examination of its contents, however, we find not to exceed three notes bearing upon botanical subjects. Such being the case we cheerfully advise all to subscribe for it, addressing John Michels, editor, box 3838, New York, and enclosing $4 the "*sine qua non.*"

THE MONTHLY INDEX to Current Periodical Literature, Proceedings of Learned Societies and Government Publications. Published at office of American Bookseller, 10 Spruce Street, N. Y., at $1 per annum. Under the above somewhat extended title, we have the *vade mecum* of the specialist, since it gives the titles of the latest articles written in almost every department of Natural History, Philosophy, Biography, Education, Religion, Art, Æsthetics, Architecture, Music, Archæology, Anthropology, Ethnology, Folk-lore, etc., etc., with the name of author and number of pages. Without claiming to "meet a long felt want" it does it admirably. Address as above.

NECTAR, ITS NATURE, OCCURRENCE AND USES. By Wm. Trelease, Ithaca, N. Y. We have received the author's edition of the above pamphlet, and hope in our next issue to make a full review. It is extracted from the report on cotton insects by J. Henry Comstock, Entomologist to the U. S. Department of Agriculture. The extract is 25 pages with a full page steel plate containing 13 figures.

RUDIMENTARY COMA IN GODETIA.—While investigating the development of the embryo-sac in the different genera of *Onagraceæ*, my attention was attracted to certain hair-like projections which appeared upon the forming ovule of *Godetia*, probably *G. grandiflora*. A careful examination showed them to be identical in structure with the forming hairs in the coma of *Epilobium*. They occurred almost exclusively at the chalazal end, one or two scattered ones being detected farther down upon the raphe. A study of the development of the coma of *Epilobium* shows that the first indication of it is a tuberculated appearance at the chalazal end. Presently these tubercles push out into elongating nucleated cells which eventually develop into the long hairs of the coma. Now *Godetia* permanently retains this tuberculated margin at the upper end, but does not usually develop its coma any farther. In the cases examined, however, the forming ovules, either in reminiscence or prophecy, stretched out their tubercles into incipient hairs. Tracing these ovules in their subsequent development it was found that these hairs gradually disappeared until when the ovules had become anatropous, there was no indication of them. As *Godetia*

has been merged into *Œnothera*, many species of the latter were examined to see if any such thing occurred in them, but no trace of such growth was detected. This would seem to indicate that if *Godetia* is not entitled to generic rank, it is at least that part of *Œnothera* which looks towards *Epilobium*.

A discrepancy must be noted here, however. In *Epilobium* the hairs of the coma do not begin to form until the ovule has become completely anatropous. But in the *Godetia* observed the incipient coma had all disappeared by the time the ovule had become anatropous, beginning to form before the nucleus is half covered by the coats. These hairs appeared in greatest size and abundance when the axis of the ovule was at right angles to its anatropous position.—J. M. C.

BOTANY FOR HIGH SCHOOLS AND COLLEGES, by Charles E. Bessey, M. Sc, Ph. D; Henry Holt and & Co., New York, 1880—The question may naturally arise in the minds of many teachers, what need is there of another botany? We have Gray's, Wood's, Youman's, etc, almost every publishing house being represented by a botany; surely it is but publishers' rivalry that is throwing this new book upon the market. Even a casual glance will show, however, that we have here no stereotyped repetition of books that have gone before, but a new departure in American botanical text books. The time has long past when the study of any of our botanical text books will be sufficient to impart even a general knowledge of the science of botany. Once the study of a little morphology, the learning of a few terms in the glossary, and the analysis of a few flowers was thought to be all the profitable study that botany could furnish students. But this state of things has entirely changed and plants are getting to be recognized as living organisms that have life histories, and that have digestion, nutrition, assimilation, circulation, respiration, reproduction and other functions just as remarkably performed as in animals. The question then arises, is it more profitable to study the plant in its life work, or simply to dissect and name its parts and their probable function. It is evident that we can study plant physiology as well as anatomy, and it is this very thing that has been so long neglected in our schools, neglected from lack of suitable text books. Our great botanists have been systematists, as is perfectly natural in a country just developing its flora, hence all botanical work in the schools has followed the same bent. Such work is not to be decried, for it is absolutely necessary and well enough as far as it goes, but it is not all of botany. To our country belong some of the finest works on morphology and classification published and they rank as the very highest authorities, but our physiology remains yet to be written. Prof. Goodale has for several years had such a work in contemplation, but its publication has been delayed, and now Prof. Besey is the first to occupy this new field.

His book is divided into two parts. Part I is upon the subject of General Anatomy and Physiology. Part II treats of Special Anatomy and Physiology. To give our readers a general idea of

this important and excellent work we give a running summary of its contents. Part I contains 12 chapters; the subject of Chapter I being Protoplasm; Chapter II treats of the Plant-Cell; Chapter III, Cell Wall; Chapter IV, the Formation of New Cells; Chapter V, the Products of the Cell, such as chlorophyll, starch, aleurone and crystalloids, crystals in cells, cell-sap, oils, resins, etc.; Chapter VI, Tissues, taking up first the various aggregations of cells, then the seven principal tissues, and last the primary meristem; Chapter VII, the Tissue Systems, the sections being the Differentiation of Tissues into Systems, the Epidermal System of Tissues, the Fibro Vascular System of Tissues, the Fundamental System; Chapter VIII, Intercellular Spaces, and Secretion Reservoirs; Chapter IX, the Plant Body, treating of Generalized Forms, Stems, Leaves in General, Arrangement of Leaves, Internal Structure of Leaves, Roots of Plants; Chapter X, the Chemical Constituents of Plants, considering Water in the Plant, Solutions and Plant Food; Chapter XI, the Chemical Processes in the Plant, such as assimilation and metastasis; Chapter XII, the Relations of Plants to External Agents, as temperature, light, gravitation, etc.

Part II begins with chapter XIII upon classification; Chapter XIV considers the Protophyta; Chapter XV, the Zygosporeæ; Chapter XVI, the Oosporeæ; Chapter XVII, the Carposporeæ; Chapter XVIII, Bryophyta; Chapter XIX, the Pteridophyta; Chapter XX, the Phanerogamia; Chapter XXI is devoted to some concluding remarks upon the number of species of plants, the affinities of the groups of plants, and the distribution of plants in time.

Of necessity the work could not be entirely or even mostly original, but rather in Part I a following of that done in the German laboratories and based chiefly upon Sachs' great "Lehrbuch." In Part II the higher plants of course conform to the system of Bentham and Hooker. The classification and treatment of the lower plants seem to be the author's own work and is probably the part of the book that is most original. Part I would at once strike one as a simplified edition of Sachs, for many of his plates are there, and how could it be otherwise, for there are no better. One naturally first turns to those subjects in which he is especially interested and passes his judgment upon a work by what he reads there. Of course this is hardly fair, but it is natural. As the writer has been engaged in investigating the development of the embryo-sac, that subject was naturally looked into first. And, in passing, we must most heartily commend the excellent indexes which make it a pleasure to look up any topic. It seemed to us that Vesque's work in the development of the embryo-sac had been neglected, and the subject was left either in the most uncertain light or with the old idea of the embryo-sac being nothing but an enlarged cell of the nucleus. A careful series of investigations by the writer has confirmed the most important of Vesque's conclusions, and it seems to us that the development of the embryo-sac, with its beautiful division of labor would be interesting to any student. The notion that the embryonal vescicle does not originate in what is to become

the embryo-sac is not spoken of, although repeated observations have proved that there is at first a distinct separation between the sexual cell and the enlarging embryo sac. The "primordial mother-cell of the embryo-sac" can be clearly made out also by any ordinarily careful observer, and then its breaking up into the axial row of four or five cells, the uppermost one of which contains the vesicle and "synergides," the second becomes the embryo sac and the two or three remaining ones subsequently secrete endosperm, can be readily traced. This is mentioned simply because it seems a pity that such an interesting line of investigation was not suggested. There is an abundance of work suggested, however, for the most active class, and we hope that very many classes will undertake it. The author plunges "in medias res," or begins at the beginning, whichever way one looks at it, by introducing as the subject of the very first paragraph, "Protoplasm" This plan he follows throughout, not avoiding the difficult points, but by directly encountering them, before the student knows it he has a clear idea of some very uncertain subjects. With Dr. Gray's admirable new text book on Structural Botany and this upon Physiology, the student of botany can get a very excellent knowledge of the science. The arrangement of the book is mostly new and at first glance most excellent, a thing of course to be tested in the class room. As to innovations, the author himself calls attention to two. In Chapter VI he recognizes seven well marked kinds of tissue, viz.: Parenchyma, Collenchyma, Sclerenchyma, Fibrous Tissue, Laticiterous Tissue, Sieve Tissue, and Tracheary Tissue. Of course these include a great many varieties which pass into each other by almost insensible gradations. The other innovation "consists in raising the Protophyta, Zygosporeæ, Oosporeæ, and Carposporeæ to the dignity of Primary Divisions of the vegetable kingdom, co ordinate with the Bryophyta, Pteridophyta and Phanerogamia." The book also contains constant suggestions with regard to laboratory work, such as the best plants from which to get certain tissues, etc., and the best method of treatment. This enables the student to go into the laboratory alone, or rather with the aid of the experience of Prof. Bessey, one of the most successfull of teachers, and perform satisfactorily all the elementary work in the histological structure of plants. We would most cordially commend the work to the use of all professors and students of botany as not only the *best* American book upon the subject, but the *only* one.—J.M.C.

THE VALLEY NATURALIST, Vol. II, No. 1—This enterprising journal has again made its appearance and this time it appears that its subscriptlon list makes its success assured. It has now 16 pages and a cover, the subscription price being $1.50. There is surely room for such a publication in the great Mississippi Valley, but a constituency of scientific subscribers and contributors is exceedingly slow to build up. The publisher is Mr. Henry Skaer, N.W. Cor. Third & Pine Sts., St. Louis, Mo.

PACIFIC COAST FLOWERS AND FERNS.—Mr. J. G. Lemmon, of Oakland, Cal., is offering some very fine plants at exceedingly low rates. He is an indefatigable collector, having traveled extensively through the West, and his collections embrace plants from Southeastern Arizona to Washington Territory. He has over 400 of the characteristic plants of Arizona, many of which are entirely new to science. He offers for sale also a collection of 50 species of Pacific Ferns, including many rare and new ones. The following terms place these rare plants within the reach of all who care to have them:

Sets of good specimens of the phænogams will be carefully selected, correctly labeled and forwarded to any address in the United States, free of postage, for $7.50 per 100. Sets of the ferns at $10 per 100. New Ferns at 25 cents each. The sets will be ready for distribution during the Christmas holidays. Applications should be in hand before December.

DECANDOLLE'S PHYTOGRAPHY.—In the American Journal of Science and Arts for August and September, Dr. Gray gives a running account of the contents of DeCandolle's last work, which is so interesting and instructive that we copy a few extracts from it.

Chapter XIII relates to difficulties in phytography which have grown out of various methods or absence of method in the nomenclature of organs, and from the want of consideration of the law of priority in such matters. The result of which in some departments, such as histological morphology, is a state of anarchy not unlike that which prevailed in the names of groups before the days of Tournefort and Linnæus. We may hope that order and lucidity will some day dawn upon this chaos and a common language replace this confusion of tongues. Meanwhile DeCandolle offers certain counsels, the utility of which, he says, is not doubtful nor the application very difficult.

(1) Hold fast to common and universally known names, whether in Latin or in modern languages. *Radix*, *caulis*, *folium*, *flos*, etc., with the vernacular equivalents, are not to give place to new-fangled substitutes. This, he thinks, will rid us of "such useless terms as *caulome*, *phyllome*, etc." Now these terms, along with *trichome*, seem to us legitimate and useful, as succinct expressions of a morphological idea; they are annoying only when pedantically ridden as hobbies over ground on which they are not wanted.

(2) Do not entertain the idea that a change in the mode of considering or defining an organ requires a change of name. Although Linnæus did take the leaf-blade for the leaf, and define it accordingly, that did not much hinder the coming in of a truer view, involving merely a change of the definition. But one may intimate that DeCandolle here comes into conflict with another rule he insists on, namely, that terms should have unmistakably one meaning. When we say—as we ever shall—that leaves are ovate, we speak according to the Linnæan definition; when we say that their insertion is alternate, we use the word in a more comprehensive sense; when we have occasion to declare that cotyledons, bracts, petals, etc., are leaves, we use the word in the most comprehensive sense. All this involves considerable am-

biguity; and the endeavor to keep the new wine in the old bottles causes no little strain. It is borne because it has been applied gradually. If Linnæus had started with, or even reached our ideas, we should happily have had a nomenclature to match. Now we must be content, for descriptive purposes, to employ some words both in a restricted and in a comprehensive sense, and let the context fix the sense, just as it must in ordinary language. Technical precision is only a matter of degree. But it is clear that the excellent rule here laid down need not forbid the introduction of terms to express our conceptions, such as *rhizome*, *caulome*, *trichome*, and the like. Yet these are ill-chosen terms, except the last. In particular, *rhizoma* has long ago been appropriated for something which is not of root nature, but the contrary.

(3) The third counsel is to change the name of an organ, as we do that of a genus or species, only when it is positively contrary to the truth, or when it has been pre-occupied.

(4) Avoid giving special names for rare or ill definable cases of structure. An epithet or short periphrasis is vastly preferable to a new and strange term, which will be seldom used and may be hardly understood. DeCandolle truly remarks that after a great multiplication of terms and distinctions generally comes some good generalization, which does away with a crowd of particular names; that what has happened in carpology is likely to occur for microscopic organs.

(5) Between two or more names choose, not the most agreeable, or even the most significant, but the one best known and most widely recognized

(6) Between names equally known and used adopt the oldest. Which are the older names is not difficult to know in the case of common organs, but is very much so in modern histology.

(7) In this matter of priority or of usage, consider only names taken from (or in conformity with) Latin or Greek. As in systematic botany, scientific and not vulgar names are to be accounted in this regard. Those who like *spaltœffnung* for *stoma* or *stomate* and *scheitel zelle*, must needs follow their own fashion; but the genius of our own and the French language resists their importation, while it adopts or adapts with ease technical terms from classical sources.

(8) Not to admit names contrary to these rules.

Chapter XVI is an interesting and pertinent one, upon the manner in which facts observed under the microscope are described; and on the great saving of space and advantage in clearness which would be gained by the adoption, for all matters perfectly capable of it, of the Linnæan descriptive style, and of Linnæan Latin. Extracts from the German of Schacht, the French of Payer, and the Italian of Gasparrini are given, and by their side a rendering in descriptive Latin; and the words and letters are counted. The German specimen so treated is diminished to considerably less than half the number of words and a little less than half the number of letters. The French simmers down to one-third the number of Latin words and less than half the number of letters; and in the French of descriptive botany to

less than one half. The Italian extract of 51 words and 256 letters is expressed in Latin of Linnæan form by 21 words and 127 letters.

To give the readers of the GAZETTE an illustration of the space saved and the clearness gained by the change to Linnæan Latin we give an extract from Schacht's *Lehrbuch der Anatomie und Physiologie* as quoted and changed by DeCandolle.

TEXT.	Same Facts in Linnæan Style.
'Die Spaltœffnungen (stomata) gehoerem der Epidermis, sie enstehen schon sehr frueh wenn dieselbe noch Epithelial-Beschaffenheit besitzt. Innerhalb einer Zelle der Oberhaut bilden sich naemlich durch Theilung zwei neue Zellen, die Membran der Mutterzelle wird darauf resorbirt und die beiden Tochterzellen weichen in der Mitte eine Spalte zwischen sich lassend, aus einander; nach der Turgescenz der Spaltœffnungzellen erscheint nun die Spalte bald enger, bald weiter. Alle Spaltœffnungen der Hœhengewaechse bilden sich auf diese Weise, sie bestehen desshalb saemtlich aus zwei Zellen, den so genannten schliefszellen."	Stomata in epidermis junioris epithelio nascuntur. Intra cellulam unam duæ novæ partitiones apparent, quæ sorores membrana matris soluta fluctuant et fissuram inter se angustam latumve monstrant; quippe vegetabilium superiorum stomata e duabus cellulis germanice *Schliefzellen* (1) vocatis constant.

Style in botanical works is discussed in Chapter XVIII, which all young botanists should study, especially the portion which treats of the admirable style of Linnæus. In speaking of botanical style in the modern languages, the author notices the great advantage which the languages of Latin stock have inherited, and which the English-writing botanists have acquired, of ready and free use of Latin and Latinized technical words by direct transference. Botanical French, English, and Italian, are contrasted with the German in this respect. Noting that the German of conversation inclines to be clear and sententious, while in botanical writings the words lengthen more and more and the sentences become badly involved, our author remarks that recently having read a couple of pages of Vegetable Anatomy, and feeling his brain somewhat fatigued with the frequency of such words as *Sclerenchymfasergruppen*, *Gefassbundentwickelung* and *Entwickelungseigenthumlichkeit*, he asked himself if that was good German style. He then recollected that Gœthe, one of the very greatest of German literary writers, was also a profound naturalist. He opened his *Metamorphose der Pflanzen*, read a page or so, and experienced a relief which he likens to that felt by a sea tossed ocean voyager when the vessel suddenly glides into a quiet harbor.

SYNOPTICAL TABLE FOR THE DETERMINATION OF FIBERS OF VEGETABLE ORIGIN.—The following table is from Vetellart's work "sur les fibres emp oyes dans l'industrie," and may be made considerable use of by botanists in the laboratory. W. H. Seaman, of the Department of Agriculture, in sending an abstract of Vetellart's work to Dr. Gray writes that "Vetellart does not tell much that is new, but has systematized our previous knowledge more than has ever before been done.

The reaction is given with dilute sulphuric acid and iodine; the most highly organized structure giving blue reaction, the less so yellow. Exactly as the more highly organized structures polarize light more strongly, e. g. spiral vessels polarize, parenchyma does not."

Synoptical Table for the Determination of Fibers of Vegetable Origin.

MONOCOTYLEDONS GIVING BLUE REACTION.

Common Name.	Botanical Name.	Where Grown.	Principal Use.	Length of Fiber			Ratio: Diameter to Length.	Diameter of Fiber.		
				Shortest.	Mean.	Longest.		Smallest.	Mean.	Largest.
Spanish grass.	Stipa tenacissima.	Algeria, Spain.	Paper.	5	1.5	3.5	125	.007		.018
Esparto.	Lygeum sparteum.	Spain.	"	1 3	2.5	4.5	160	.012	.015	.020
Pine Apple.		Torrid Zone.	Cordage.	3	5	9	830	.004	.006	.008

MONOCOTYLEDONS GIVING YELLOW REACTION.

New Zealand Flax	Phormium tenax.	New Z aland.	Cordage.	5, 8	9	15, 10	55)	.010	.016	.02)
Adam's Needle.	Yucca.	Western America.	Paper.	.5	4	6	170	.01	.020	.02
Bowstring Hemp.	Sanseviera Zeylandica.	Torrid Zone.	Cordage.	1 5	3	6	150	.015	.020	.026
Century Plant.	Agave Americana.	Warm Temp. Zone.	"	1.5	2.5	4	100	.020	.024	.032
Banana Hemp.	Musa textilis.	Tropics (Phillipine).	"	3	6	12	250	.016	.024	.032
Palmetto, etc.	Chamærops humilis.	Warm Temp. Zone.	Paper.							
Date Palm.	Phoenix dactylifera.	" " "		2	3		150	.016	.020	.024
Talipot.	Corypha umbraculifera.	Tropics.		1.5	3	5	120	.016	.024	.028
Palm-oil palm.	Elais Guinensis.	"		1.5	2.5	3.5	230	.010	.011	.013
	Mauritia flexuosa.									
	Raffia tœdigera.									
Cocoa.	Cocos nucifera.			.4	.7	1.		.012	.020	.024
Vegetable bristles.	Arenga saccharifera.									

Synoptical Table for the Determination of Fibers of Vegetable Origin.

DICOTYLEDONS GIVING BLUE REACTION.

Common Name.	Botanical Name.	Where Grown.	Principal Use.	Length of Fiber.			Ratio: Diameter to Length.	Diameter of Fiber.		
				Shortest.	Mean.	Longest.		Smallest.	Mean.	Largest.
Flax-Linen.	Linum usitatissimum.	Temperate Zone.	Thread-cloth.	4	25-30	66	1200	.015	022	.037
Hemp.	Cannabis sativa.	" "	Cordage.	5	15-23	55	1000	.016	.022	.050
Hop.	Humulus Lupulus.	" "		4	10	19	620	.012	.016	.018
Nettle.	Urtica sp.	" "		4	27	55	550	.02	.05	.07
China-grass.	Borhmeria nivea.	Warm Temp. zone.	Grass-cloth.	60	120	200	2400	.05	.08	
Paper Mulberry.	Broussonetia papyrifera	" " "	Paper (in Japan).	6	15	25	240, 430	.025	.030	.035
Sunn.	Crotalaria juncea.	(India) Torrid "	Cordage. Sail Cloth.	4	7.8	12	260			
Broom.	Genista scoparia.	Temperate "	Paper.	2	6	9	330			
Spanish Broom.	Spartium junceum.	South " "	Cloth-paper.	5	10	16	500			
White Melilot.	Melilotus alba.	North " "		5	10	18	330			
Cotton.	Gossypium.	South " "	Cloth.	25, 10	25	40, 20				

DICOTYLEDONS GIVING YELLOW REACTION.

Hibiscus.	Hibiscus cannabinus.	Temperate Zone.	Cordage.	2	5	6	240	.014	.021	.033
Linden.	Tilia Europea.	" "	Mats.	1.25	2	5	125	.014	.016	.020
Jute.	Corchorus sp.	(India) Torrid "	Coarse Cloth, Etc.	1.5	2	5	90	.020	.0225	.025
Lace-bark Tree.	Lagetta lintearia.	Brazil Antilles.	Strings.	3	5	6	500	.01		.02
Willow.	Salix alba.	Cold Temp. Zone.	Cords, Cloth.		2	3	90	.017	.022	.030

THE ANTHERS OF CLETHRA.—To all eastern botanists our common *Clethra, C. alnifolia,* L., is certainly familiar, yet as far as I know no one has noticed the striking peculiarities of the anthers. In the more southern species, *C. acuminata,* Mx., these are even more marked. During the past summer I had opportunity to make a careful study of both species in all stages except fruit. According to Bentham and Hooker (Gen Plant II, 603) the genus *Clethra* is a waif as far as the suborders of Ericaceæ are concerned—"genus anomalum," they call it—but Dr. Gray (Syn. Fl. N. A. II, 17) places it among the *Pyrolineæ.*

There is nothing peculiar in the development of the flowers. In *C. alnifolia* there is a marked difference between the outer and inner whorl of stamens while young, the latter being noticeably shorter. From the very beginning the anthers are *extrorse* and when young very decidedly epipetalous. They begin as mere knobs at the base of the petals but soon become sharply sagittate, which shape they retain. As long as the anthers are enclosed in the bud the filaments are bent upon themselves, but differently in the two species. In *C. alnifolia* they are shaped like a fish hook bearing the anther at the point corresponding to the barb, while the filament is represented by the shank. In *C. acuminata* the filament resembles an interrogation point (?) except that the first bend (counting from below upwards) is almost a right angle instead of a gradual curve. In all species these bends are more or less marked as may be seen in various figures.*

But in none of the figures referred to is to be seen anything peculiar about the anther or connective, though several figure the enlarged stamens. Not in any of the descriptions of foreign species is there notice of anything in the structure of the anthers to provide for their retroversion at anthesis common to the whole genus †

As soon as the flower begins to open, the growth of the filaments, which is extremely rapid at this time, pushes the anther beyond the corolla, and it, relieved of the compression of the petals, immediately springs to a horizontal position. The completion of obversion until the anther becomes *introrse* then proceeds more slowly though it is accomplished in a few minutes after the first spring has taken place. There seem to be two causes for this freak. The straightening of the filament both lengthens the stamen and continues the somersault begun by a special device, viz.: a cushion of turgid cells on the back of the connective. This cushion is continuous with the filament, but is not joined to the connective throughout its whole extent, being arched away from it about the middle of the anther. The cushion divides into two tongues, which taper to slender points as they pass down the thecæ. Under the microscope the cells of the upper part of the filament and of this cushion are seen to be turgid while the anther is still held by the corolla, but soon after it escapes these become shriveled and the cushion withers first. The outside cells are shown by a

*Vide Meissn. in Mart. Fl. Bras. VII, t. 64, 65, 66.—Lam. Illustr. t. 369.—Bot. Mag. t. 1057, 3743.—Lindl. Bot. Reg. 1842, t. 23.

†Vide DC. Prod. VII, 5-9.—Walp. Rep. II, 726; VI, 417; Ann. I, 479.—Miq. Fl. Ind. Bat. II, 1056.—Griseb. Fl. Brit. W. Ind. 141.

cross section to be thinner-walled and larger than the inside ones and all are filled with oil globules of various sizes in addition to the protoplasmic contents. This cushion is about 1–60th of an inch in width and one-half that in thickness. Near the center, as also of the connective, runs a fibro-vascular bundle.

Between our two species there is a difference in the time of dehiscence of the anthers—those of *C. alnifolia* not breaking until complete anthesis, while in *C. acuminata* they break just as the petals separate at the top. Both are proterandrous. Both also are very fragrant, but the fragrance is earlier perceptible in *C. acuminata*, correlated with the earlier dehiscence of the anthers. In this species the nectaries are very large and double, one on each side of the filament at the base of the petals. In *C. alnifolia* they are smaller and apparently single, situated between the filament and the petal.

Fertilization is effected almost altogether by honey bees. They alight on the outspread petals and thrust the head down by the side of the style frequently touching the stigmas. In crawling around over the spike of flowers almost every part of the body comes in contact with the stigmas. Cross-pollination is thus abundantly provided for as usual both by proterandry and the visits of insects.

I have not Bentham and Hooker's Genera Plantarum by me, but if my memory is correct they say "Pollen globosa." I find the pollen of both our species elliptical with three slits, as stated by Edgeworth and only globose after the absorption of water.—C. R. BARNES, *La-Fayette, Ind.*

VESQUE'S DEVELOPMENT OF THE EMBRYO SAC.—In the *Annales des Sciences Naturelles*, 1878, M. Julien Vesque, after discussing the development of the embryo-sac of Angiosperms, draws the following conclusions, which somewhat modify our previous notions concerning the embryo sac. Or rather our text books merely stated that it was an enlarged cell of the nucleus without giving any account of its development.

M. Vesque now fills this hiatus and as his conclusions have been mostly confirmed we feel confidence in printing them in the GAZETTE, urging upon our physiological botanists to test them as far as they are able.

1. In the Angiosperms the embryo sac of Brongniart is not composed, as in the Gymnosperms, of a single cell; it results on the contrary from the blending of at least two cells superposed and originally separated by partitions.

2. The cells which are to compose subsequently the embryo-sac all proceed from a single primordial mother cell. M. Warming, who has discovered them, has with reason given to them the name of special mother cells, comparing them with mother cells of pollen or spores. This bringing together is justified by the physical characters of the partitions.

3. When the evolution of the special mother cells has been completed, each one of them gives rise to four nuclei homologues of the four grains of pollen produced in the same mother cell.

4. The variations which I have observed in the different types of Angiosperms depend on the arrest of development more or less early which seizes the special mother cells.

5. The first cell always forms the sexual preparation. It blends itself with the second cell to thus constitute the greater part of the embryo-sac. When the second cell produces a "*tetrade*," the eight nuclei freed from the embryo sac act as M. Strasburger describes it in *Orchis* and in *Monotropa*. This fact is observed in certain Monocotyledons and dialypetalous Dicotyledons.

6. The other special mother cells (3, 4, 5) may produce some "*tetrades*." Each one of the vesicles is homologous with a grain of pollen, and it is tempting to give to it the name of antipodal. When these mother cells persist in their primitive condition without producing "*tetrades*," they themselves simulate antipodal vesicles superposed, not juxtaposed. They differ from them from a morphological point of view and I have given to them the name of *anticlinal cells*.

This condition has been observed in many Monocotyledons, certain dialypetalous Dicotyledons, and in almost all the Gamopetalæ.

7. The 2d cell appears to undergo at first an arrest of development. In this case, its nucleus becomes directly the nucleus proper of the embryo-sac, and this cell does not produce any antipodal vesicle. This fact, observed in some Monocotyledons and Dialypetalæ, becomes the rule in Gamopetalæ, which are, from this point of view, the plants most removed from Cryptogams.

8. In the Gamopetalæ (with very few exceptions), cell one alone produces a "*tetrade*," complete or incomplete, which is no other thing than the sexual preparation composed of two or three or four vesicles.

The second cell seems to perform the vegetative part of the embryo-sac. Its undivided nucleus becomes the nucleus of the embryo-sac.

The cells 3, 4, 5 (or 3, or 3 and 4, according to the number of the special mother cells) are some anticlinal, or produce the antipodal vesicles by dividing their nucleus.

9. In the greater part of Gamopetalæ, the formation of the endosperm is deferred to subsequent development, by division, of one or several of the special mother cells. These last being homologous with the mother cells of spores, it is legitimate to consider the endosperm of these plants as a sterile female prothallus.

BOTANICAL CONTRIBUTIONS, by Asa Gray. Issued September 1, 1880.—These annual contributions to North American Botany are always greeted with the greatest interest by systematic botanists, and the pages can hardly be cut and run through hastily enough to satisfy their eager curiosity. What new species and genera have come into the world and what have departed this life, are questions that first occur. This paper is largely devoted to recording some of the results of Dr. Gray's elaboration of the vast order Compositæ for his Synoptical Flora. As this portion of the Flora cannot be published at once, botanists are under very great obligations for some of the "ad-

vance sheets," containing the results of work upon some of the most perplexing groups. We will note some of the most important things in passing, merely giving what would catch a botanist's eye in turning over the pages In VERNONIA the principal change from Torrey and Gray's Flora is the restoration of *V. altissima*, Nutt., standing between *V. fasciculata* and *V. Baldwinii* or *Noveboracensis*. A new species appears under the name of *V. Lettermanni*, Eng., from Arkansas.

Aplopappus integrifolius, T. C. Porter, is taken up from an unpublished name of a plant collected by the writer in Wyoming in 1872, and three new species are added.

SOLIDAGO is divided into three primary sections or subgenera, viz.: *Virgaurea*, *Euthamia*, and *Chrysoma*. The *Chrysastrum* section of Torrey and Gray is reduced to a subsection of the first, and is made to include *S. petiolaris*.

The southwestern genus APHANOSTEPHUS has now five recognized species which Dr. Gray arranges and characterizes.

A new genus of the Asteroideous Compositæ is proposed under the name of GREENELLA, in honor of Rev. E. L. Greene, and the single species is *G. Arizonica*.

CHÆTOPAPPA, DC., is made to include *Distasis*, DC. The Rocky mountain genus TOWNSENDIA which has so long perplexed us appears fresh from Dr. Gray's hands in the form of a most satisfactory synopsis, and 3 or 4 new species are added. The genus now contains 17 species.

Then follows a synopsis of the genus ERIGERON, which "shades off into *Aster* in more than one direction; and its subgenus *Cœnotus* fairly runs into *Conyza*. It can be limited only by taking into account a combination of characters, and insisting here upon one, there upon another. The general differences between it and *Aster* are found,—1. in the simpler involucre, of equal neither foliaceous nor appendiculate narrow bracts; 2. in the very numerous and narrow rays of the typical species; 3. in the very short, broad, and obtuse style-appendages; 4. simpler stems, naked above or with few more pedunculate heads; 5. less copious and more fragile pappus; 6. smaller achenia; their nervation is of less importance, but mostly there are only the marginal nerves." The three primary sections are *Euerigeron; Trimorphæa*, and *Cœnotus*, the first containing 51 species, the second 3, the third 5.

"ASTER. The revision of this vast genus is not yet completed, owing to the great difficulty which is experienced in settling the synonomy and the limits of some of the earlier as well as of the later known species. It is intended to accept the genus in the wide extent assigned to it in the Genera Plantarum of Bentham and Hooker, at least so far as North America is concerned, and also to include *Brachyactis*. The subgenera may be arranged in two series; the first of perennials, the second of annuals and biennials; and an endeavor has been made to dispose of the perennial Asters under the following subgenera: AMELLASTRUM; MEGALASTRUM, which connects the genus

with *Townsendia*; HELEASTRUM; HESPERASTRUM, containing but a single species, *A. Shastensis*; BIOTIA; EUASTER, or Aster proper; DŒLLINGERIA; IANTHE; ORTHOMERIS. The annual and biennial Asters are grouped in the following subgenera, OXYTRIPOLIUM, CONYZOPSIS, and MACHÆRANTHERA. Among the true Asters are several forms which become species, as *A. Porteri* for *A. ericoides*, var. *strictus* and *A. Pringlei*, from the northern end of Lake Champlain.

A new genus of *Asteroideæ* is proposed under the name of GUNDLACHIA, a West India plant which had been wrongly referred to *Solidago*. Other new Compositæ named belong to the genera *Chænactis*, *Actinolepis*, *Laphamia*, *Fleischmannia*, *Eupatorium*, and *Philactis*.

The second part of the paper contains descriptions of some new species of ASCLEPIAS. Three species from southern-western United States are named by Mr. E. L. Greene, and three from Mexico by Dr. Gray.

The third part describes a new genus of *Gentianaceæ*, and names it GENIOSTEMON, Engelm. & Gray. It contains two species, both of them Mexican.

Part four contains "Miscellaneæ of the North American Flora." Of course there is a new *Astragalus*, and it bears the name of its discoverer, Mr. E. L. Greene. A species of *Sedum* from near Salt Lake City bears the name of our good friend, Mr. Thos. Meehan. It was collected by Mr. John Reading, the live plant being communicated by Mr. Meehan. In dedicating it Dr. Gray pleasantly remarks, "It is so desirable to connect in this way the name of Mr. Meehan with the botany of the country which he has done so much to illustrate, that the actual collector will probably join us in wishing it to be commemorated by this pretty little species of *Sedum*. It will not make much show among Meehan's "Flowers of the United States Illustrated," of which four goodly volumes have already appeared under his editorship; but it is to be hoped that it will find a place in the fifth volume.

A new species of *Douglasia* is described from Mount Hood, Oregon, having been collected by Joseph and T. L. Howell. *Gilia depressa* is decribed by Marcus E. Jones from southern Utah.

A new genus of *Euphorbiaceæ* from Arkansas and Texas is described under the name of REVERCHONIA, in honor of M. Julien Reverchon, of Dallas, Texas. "The relationship of this plant to *Phyllanthus* is so close, that, were it not for a combination of characters, it might be taken for an aberrant *Phyllanthus*."—J. M. C.

GAZETTE FOR JANUARY, 1880.—If any readers of the GAZETTE have duplicate copies of Vol. V, No. 1, we would be glad to buy them at the regular rates.

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